Data Modelling
Relational Database
Exercise –1

1. Create ERD Diagram for the following case.

Projects, Inc, is an engineering firm with approximately 500 employees. A database is required to keep track of all employees, their skills, projects assigned, and departments worked in.

Every employee has a unique number assigned by the firm, and the database is required to store the employee's name and date of birth.

If an employee is currently married to another employee of the company, the date of marriage and who is married to whom must be stored; however, no record of marriage is required if an employee's spouse is not also an employee.

Each employee is given a job title (for example engineer, secretary, etc) and this must be stored. An employee does only one type of job at any given time and we only need to retain information for an employee's current job.

There are 11 different departments, each with a unique name. An employee can report to one department only. Each department has a phone number.

To procure various kinds of equipment, each department deals with many vendors. A vendor typically supplies equipment to many departments. We are required to store the name and address of each vendor and the date of the last meeting between a department and vendor.

Many employees can work on a project. An employee can work on many projects but can only be assigned to at most one project in a given city. For each city we are interested in state and population.

An employee can have many skills (preparing material required, checking drawings, and so on), but she or he may use only a given set of skills on a particular project. (For example, employee Murphy may prepare drawings for the South West Project and check drawings for the North East project. Employees use each skill that they possess in at least one project. Each skill is assigned a number, and we must store a short description of each skill. Project numbers distinguishes projects, and we must store the estimated cost of each project.

Relational Database Data Modelling

Exercises

1. A company has a number of employees. The company also has several projects. Each employee may be assigned to one or more projects or may not be assigned to any project. A project must have a least one employee assigned to it and may have any number of employees assigned.

   Draw an ERD for this situation showing optionality and cardinality.

   An employee's billing rate may vary by project, and the company wishes to record the applicable billing rate for each employee when assigned to a particular project.

   Which entity should have the billing rate attribute?

   (Chapter 3, Modern Database Management, McFadden/Hoffer)

2. A university has a large number of courses in its catalog. Each course may have one or more different courses as pre-requisites, or may have no pre-requisites at all. Similarly, a particular course may be a pre-requisite for any number of courses, or may not be a pre-requisite of any other course.

   Draw an ERD for this situation showing optionality and cardinality.

   (Chapter 3, Modern Database Management, McFadden/Hoffer)

3. A real estate firm lists properties for sale. The firm has a number of sales offices in several towns. Each sales office is assigned one or more employees. An employee must be assigned to only one sales office.

   For each sales office, there is always one employee assigned to manage that office. An employee may manage only the sales office to which he/she is assigned.

   Each property must be listed with one (and only one) of the sales offices. A sales office may have any number of properties listed, or may have no properties listed.

   Each property has one or more owners. An owner must own one or more properties.

   Draw an ERD for this situation showing optionality and cardinality.

   (Chapter 3, Modern Database Management, McFadden/Hoffer)

4. For the previous problem, below are some of the attributes that must be stored for the entities as shown.

ENTITY	ATTRIBUTE	NOTES
SalesOffice	Office_No Office_Name Location	Components of location include: suburb, city, state
Employee	Empl_ID Empl_Name Location	Components of location include: suburb, city, state
Property	Property_ID Location	Components of location include: suburb, city, state
Owner	Owner_ID Owner_Name Location	Components of location include: suburb, city, state

An attribute of the relationship between property and owner is Percent_Owned.

Reconsider the ERD you drew in problem 3 – would you make any changes to this ERD now that you know the attributes?

5. Projects, Inc, is an engineering firm with approximately 500 employees. A database is required to keep track of all employees, their skills, projects assigned, and departments worked in.

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Draw an ERD for this situation showing optionality and cardinality.

(Chapter 3, Modern Database Management, McFadden/Hoffer)